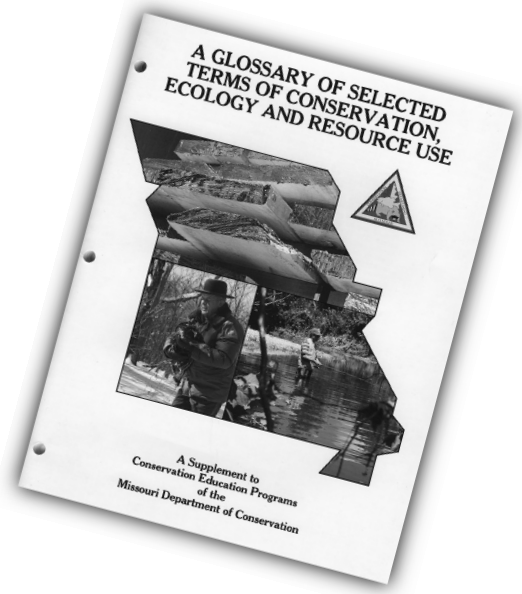
Conservation Curriculum

THIS ISSUE

This issue of the *Resource* connects agriculture and conservation. The curriculum insert provides specific lesson plans on the topic at three separate grade levels with pages ready to copy for student activity. The back page of the curriculum insert includes additional resources to supplement conservation instruction.

garage sale

The Conservation Department is having a garage sale! We are overstocked on certain items and would like to offer them to you. While we always have a wide variety of educational information available free of charge, we extend the opportunity for you to request multiple copies of the items listed below. To order, clip the form below and send to Distribution Center, Missouri Department of Conservation, P.O. Box 180, Jefferson City, MO 65102-0180 or call 573-751-4115 ext 3837 or fax 573-522-2020.



___**Casting Equipment** - A 71 page instructional book covering ethics, specific subject information, lesson plans and student handouts on freshwater casting. **(E100)**

___**A Glossary of Selected Terms of Conservation, Ecology and Resource Use** A 77-page reference source to supplement the Department's expanded conservation education programs. **(E045)**

___**Missouri Game Birds Poster -** Large colorful poster of Missouri game birds with a lesson plan to help students identify the birds, their habits and habitats. **(E001)**

___**Missouri Mammals -** Large colorful poster showing Missouri mammals. **(E022)**

___**Rare & Endangered Amphibian-Reptile Poster -** Large colorful poster of Missouri's rare or endangered amphibians and reptiles **(E00024)**

___**Life in a Fencerow -** Large colorful poster of a Missouri fencerow. Accompanying lesson plan helps students identify wildlife that depend on fencerows for food and cover. Lesson tied to Missouri Show-Me Standards. **(E084)**

Name _____

School Shipping Address (UPS will not deliver to a PO Box number)

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Contributing to this issue. . .

Thanks to the individuals and Missouri Department of Agriculture who contributed to the curriculum insert.

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Missouri Department of Agriculture
Show-Me Agriculture Winter 2001 issue

Conservation & Agriculture

Partners in Grime

PreK-2

Objectives:

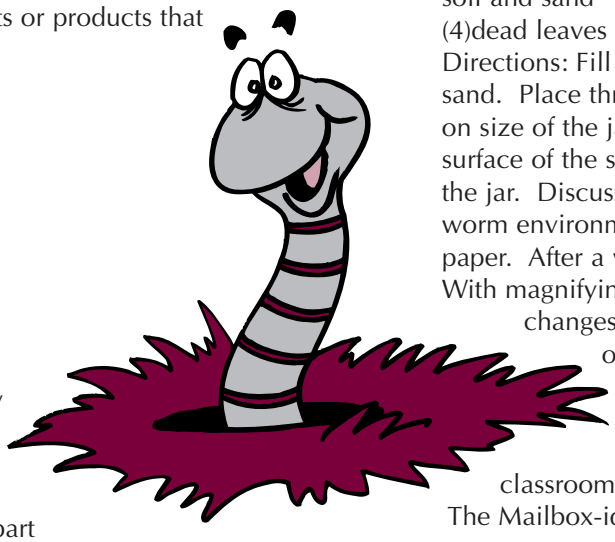
Children will understand why worms are important to agriculture and conservation. Second, they will learn that corn is a seed. Third, children will be able to identify two corn products or products that are made from corn.

Materials:

- Adjoining copy page
- Stapler
- Scissors
- Crayons

Procedure

1. Color each picture
2. On the last page draw something related to earthworms and corn
3. Cut picture squares apart
4. Staple left sides together forming a book
5. Have each child tell the story of a corn seed
6. Adults write a story line as dictated by child



earthworms

Earthworms are very important to conservation and agriculture. They improve topsoil and make it healthier for plant growth. They eat the dead organisms in the soil. They digest the parts their bodies need and excrete the rest, making soil richer in minerals which are necessary for plant growth.

Earthworms may be so tiny you need a magnifier to see them or they can grow to be several feet long. There are many different kinds of earthworms and we know them by names such as red wrigglers, night crawlers and field worms. Earthworms have no head, eyes, teeth or antennae. Their body is made up of many ring-like segments easy to see. After it rains earthworms can usually be found near the surface of the soil.

Some people raise earthworms to sell as fish bait or to help enrich poor soil. Earthworms are a friend to conservation too. They help compost fallen rotting trees and leaves, turning them into rich soil for plants and trees to use for food.

Create a worm world

Materials needed are (1) large glass jar with lid (2)damp soil and sand (3)six earthworms (4)dead leaves (5)black paper.

Directions: Fill the jar with alternate layers of damp soil and sand. Place three to six earthworms in the jar (depending on size of the jar). Add a few dead leaves to cover the surface of the soil. Punch holes in the jar lid and place on the jar. Discuss with the children the appearance of the worm environment. Cover the sides of the jar with black paper. After a week has passed, remove the black paper. With magnifying glasses have the children observe the changes in the earthworm's world. Once your study of earthworms has ended be sure to release them where they will survive. A flower bed is a good choice.

Adapted from USDA - Ag in the classroom-Worm Watching <**www.agclassroom.org**>
The Mailbox-ideas for Teachers Aug/Sept 1995 p.18-23

Seeds - Corn

Corn is Missouri's second largest crop in production and it is also our nation's top crop. Corn is used to make many different types of products, not just food for animals and people. Corn is used to produce many products found in the classroom, including paper, ink, glue, batteries, crayons, paint, play dough and even the clothes you are wearing.

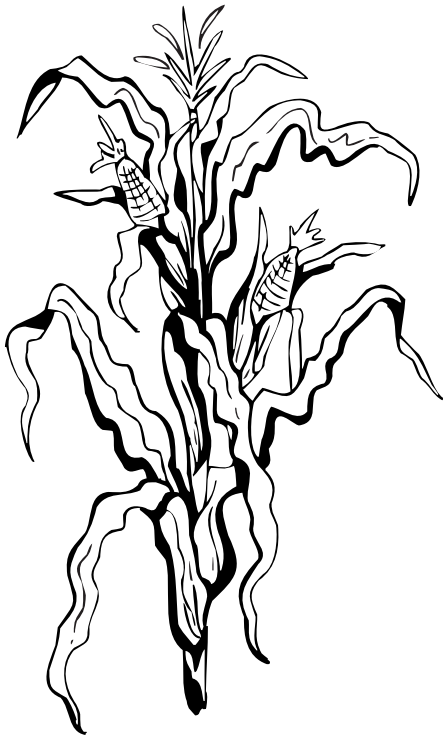
The kernel is the most important part of a corn plant. It is the SEED. It contains everything needed for a new plant to grow. There are four major types of corn:

- Sweet corn - eaten as a vegetable
- Popcorn - eaten as a snack
- Field corn - used for animal feed and other industrial purposes
- Seed corn - planted for crop production

All four types of corn grow on a corn cob. Each ear of corn can contain as many as 600-800 kernels. Kernels are the seeds of new life, storing renewable energy.

Wild animals, such as deer, turkey, squirrels and raccoons, like to eat corn too. Leaving the outside rows of a corn field uncut benefit the animals by providing not only food, but cover from predators. Corn - it's simply a-maizing.

Adapted from Missouri Corn online
<www.mocorn.org/facts.htm>
NCGA - Corn Curriculum **<www.ncga.com/education>**

THE LIFE of a CORN SEED		
		

SHOW-ME AGRICULTURE

5-8

Missouri Department of Agriculture, Winter 2001 issue

Standards:

Goal 1 - 5,6 Goal 4 - 1
Goal 3 - 5 MA 1, 4

Materials

Adjoining copy page and pencil.

Procedure

Read the articles and follow with math lesson.

Space Age Jeans

If someone asked you where your denim jeans came from, what would you say? You would probably say that they came from the store. Did you ever stop to think that your jeans could have come from a farm? Denim jeans are made from cotton. Cotton is a crop that is grown on farms in southeast and southwest Missouri. Southern states such as Texas and Arkansas grow most of our cotton.

Farmers in some parts of Missouri raise large amounts of cotton on their farms. In the spring, a cotton farmer uses a big tractor with a special planter to plant the cotton seeds. The cotton plants grow for several months and form cotton bolls (the part of the plant that contains the cotton fibers). A large cotton picker harvests cotton bolls later in the fall.

Read this story about a "space age" Missouri cotton farm:

Mr. And Mrs. Brown are cotton farmers. They live in southeast Missouri and each year they plant about 1200 acres of cotton. Their farm measures nearly two miles long and one mile wide. The Browns have two huge tractors that they use to prepare the soil and plant the cotton seeds. The Browns also use a GPS guidance system when planting, spraying, fertilizing, tiling and harvesting. GPS stands for Global Positioning System. GPS uses satellites to allow the Browns to tell exactly where they are in their fields. One of their large tractors is fitted with a light bar that receives a signal from a satellite. While driving the tractor, the farmer can watch a bar of light to make sure the tractor is staying on a straight line and is not going over an area for a second time. The light bar GPS system allows the Browns to work in dust, fog, wind, or the dark. They use the GPS to map fields so they can apply just the right amount of fertilizer to each area of the field. This is important so they don't put too much fertilizer on any part of the field. That would be a waste of their time and money. When the Browns are using the tractor, there is a computer in the tractor that receives information from the satellite. When the cotton plants are growing, the Browns can use GPS information to help decide exactly where to spray a pesticide. Pesticides are used to prevent insects from damaging the plant, but farmers don't want to use too much of them. At harvest time, the large cotton picker not only harvests the cotton, but it also keeps track of how much cotton was produced in each part of the field. The farmer can then have a map that tells which parts of each field produced lots of cotton and which areas did not produce so much. Then next year, they can spread more fertilizer on the areas that were not productive or plant a different crop in that area.

Do you think this sounds like a story from the future? Just a few years ago, we would have said that this was a "space age" farm. However, this story tells about how some Missouri farms produce cotton in the year 2001 –right now! There is no doubt that the cotton in your jeans came from a cotton farm and it is very possible that satellites far above the earth played an important part in the production of that cotton.

Sheep and Wool

Most Missouri sheep grow from six to sixteen pounds of wool every year. This wool keeps them very warm. However, sheep would get uncomfortable if they had too much wool during the summer. Therefore, once a year sheep farmers hire a person to come to their farms to take the wool off the sheep–this person is called a shearer. In early days, shearers used hand shears that were like very sharp large scissors to remove the wool. Today shearers use electric shears that quickly remove the wool. Sheep can be sheared any time but usually it is done in the spring. A good shearer must be strong because sheep can weigh more than 200 pounds. They must also be gentle as sheep have very tender skin and are easy to cut.

All of the wool that is removed from one sheep is called fleece. The amount of wool will depend on the size and breed of the sheep. After dirty parts of the wool are removed from the fleece it is packed into large plastic bags. The bags hold several hundred pounds of wool. Wool is sold to a company that will then sell to a woolen mill.

At the mill, the wool is scoured (washed) to remove oil and dirt. The wool will then be carded, which will separate the wool fibers so they can be spun into yarn. The wool yarn can be dyed and is then woven into fabric or knitted into a nice, warm sweater.

Agri-Math

A Bale of Cotton

After cotton has been harvested it is sold in a bale. A bale is a big package of cotton that weighs about 500 pounds. One bale contains enough cotton to make about 250 pairs of children's jeans. Use this information to help you answer these questions about cotton and jeans.

1. If cotton is selling for sixty cents per pound, how much does a farmer get for selling one bale of cotton?

2. How many pounds of cotton are used to make one pair of jeans?

3. How much money does the farmer get for the cotton used to make one pair of jeans? (Use questions 1 and 2 to help solve this problem.)

4. About how much does a new pair of jeans cost? (Look in your local newspaper or clothing catalog for current prices.)

5. How much more does the new pair of jeans cost than the amount that the farmer received for the actual cotton in the jeans? (Use question 3 to help solve this problem.)

6. For discussion: Since a farmer gets only a small portion of the total cost of a pair of jeans, who gets the rest of the money? (Economic term is middle man.)

Shearing calculations

1. Kevin sheared 100 sheep today. If each sheep produced 7 pounds of wool, how many pounds of wool does the farmer have to sell?

2. If a wool bag holds 200 pounds of wool, how many wool bags should the farmer buy? (Note, you cannot buy a part of a wool bag.)

3. Kevin can shear one sheep in three minutes. How many can he shear in an hour?

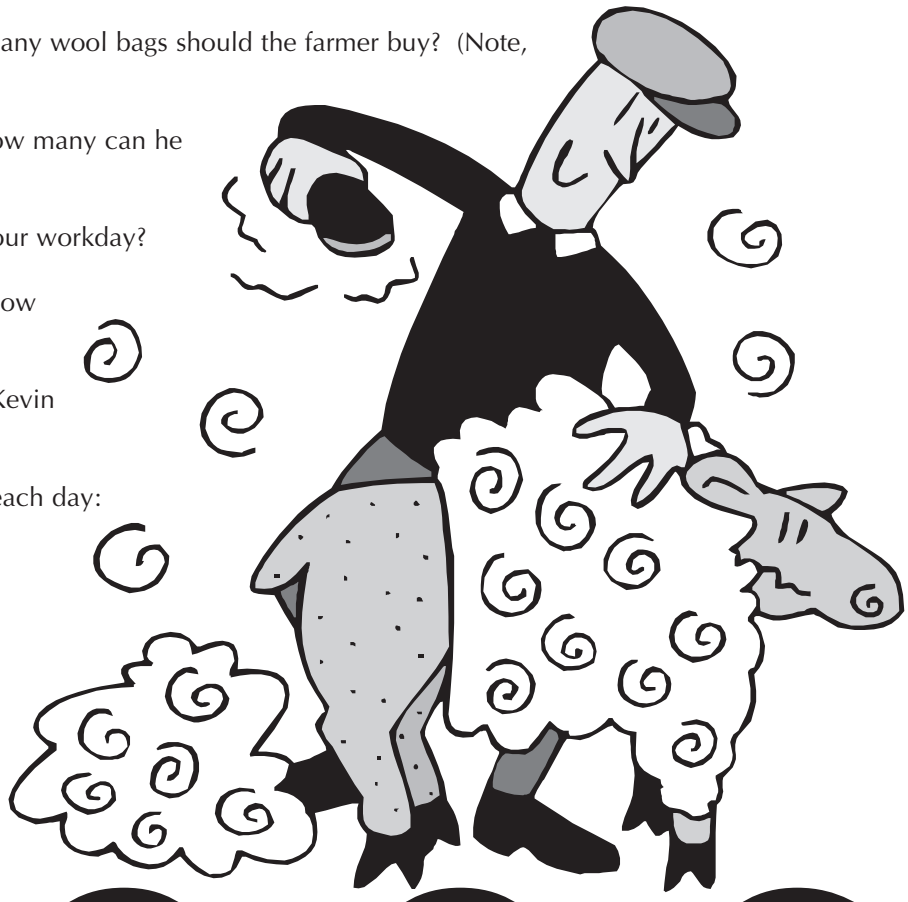
4. How many sheep can Kevin shear in an eight-hour workday?

5. If he charged $2.00 per sheep that he sheared, how much did he make per day?

6. If a farmer has 800 sheep, how many days will Kevin have to shear?

7. Here are the numbers of sheep that he sheared each day:
   Monday - 100
   Tuesday - 90
   Wednesday -110
   Thursday - 120
   Friday - 80
   How many total sheep did he shear this week?

8. What was the average number of sheep that he sheared each day?



Gardens & Green Tracts

What do they have to do with CO2?

9-12

Objectives

After completing this activity, students should be able to:

1. Draw and analyze an appropriate scientific graph for data given in table form for benefit of high levels of CO2 to plants. (Goal 1.5, 6 & 8, IA.1)
2. Identify the independent and dependent variables for data they are given. (Goals 1.1 & 3, IB.1&3)
3. Change the independent variable to develop an experimental design of their own. (Goals 1.1 & 3, IB.1&3)
4. Write a question that promotes scientific research on the topic introduced and develop a hypothesis related to this question. (Goals 1.1 &2 & Goal 3, IB 1 & 3)
5. Write a proposed procedure to test this hypothesis that is logical and includes several steps. (Goals 1.1 & 3 & Goal 3)

Background

This activity uses the same format developed by Missouri teachers for the 2002 performance section of the MAP test. It will allow students to practice skills included on the high-school level test. In addition, the hands-on portion uses inquiry techniques beneficial to student learning.

Procedure

These steps correspond to the numbered steps on the adjoining student page.

1. Have the students read the scenario and examine the table of information given regarding CO2 levels and plant leaf area for maze plants. Point out that 340 ppm is the level of CO2 that is considered to be "normal" and 680 ppm is twice that level. Have the students write a title for the table.
2. Discuss the best type of graph to represent this information. Since both the dependent and independent variables are continuous, the best type of graph is a line graph. Make sure that each student graphs the information following the standards used by the state assessment –
   - Provides an appropriate title that tells the relationship between the independent and dependent variables.
   - X axis is labeled with the independent variable and Y axis with the dependent variable
   - X and Y axis numbered correctly and consistently to **fill** the grid.
   - X and Y axis are labeled with units
   - Points for two groups of data are plotted separately on the same graph with a key given to distinguish them.
3. Instruct students to answer questions for this part of the activity. The answer to d. should include information about lab technique, limited data, repeatability, and number of trials. You may have to point out some of these limitations to students. Discuss the number of trials needed to make an investigation scientifically significant (25 trials minimum).
4. This section promotes students designing an experiment of their own. The four questions are adaptations of the "Four Question Strategy" written by Cothron, Giese, and Rezba , 1993. The answers to the four questions can be used to determine what the students know about the subject. They can also be used to lead students to identify what experiments can be done to obtain new information on their topic. The questions promote excellent class discussions, making students feel more comfortable writing an experimental design on their own.
5. An outline of requirements for the experimental procedure is provided to assist with teacher scoring.
6. The questions and exercises for the procedure are designed to complement either performing or not performing the experiment. Either way, discussion is valuable to students as they prepare for MAP.
7. The section is flexible allowing students to perform their own experiment if time allows. Students aren't required to perform experiments they develop for the MAP test but much can be learned from hands-on activities.
8. This final section focuses back to the original question. This takes the exercise full circle and promotes further discussion of the topic.

A recent environmental trip to Japan impressed a group of students with the number of plants and gardens located there. Large household gardens were observed as well as small gardens on nearly every balcony and doorstep. If space allowed, plants were there. Students learned the Japanese government takes CO_2 emission very seriously. They promote activities such as gardening and planting green tracts to reduce the amount of CO_2 and other greenhouse gases in the atmosphere. Studies are conducted regarding the influence of plant growth on the environment and vice-versa. After returning to the U.S., one student pursued her interest in gardening and CO_2 reduction and identified interesting information. The table below includes information discovered relating to CO_2 and maze (corn) growth.

Table I:

Days of Growth	Leaf Area (cm^2): 340 ppm CO_2	Leaf Area (cm^2): 680 ppm CO_2
5	28	28
10	115	120
15	363	466
20	400	885
25	598	889
30	692	965
35	781	995
40	788	1018

1. Identify the independent and dependent variables and provide a title for the table that describes their relationship.
2. Discuss with your teacher the best type of graph to use representing all of the information in the table, and then graph the information. Remember to use all of the components of an appropriate scientific graph for the data.
3. Answer the following questions based upon the graph.
   a. How does leaf area growth compare between the two situations?
   b. What pattern/s do you see represented by the data? Support your thoughts with specific information from the table.
   c. What would you predict the data to show if it had been given for 45 and 50 days of growth? Why?
   d. What possible sources of error could there have been related to the information found in this table?
4. What other types of questions does this graph raise? Write a different question that you could answer by doing an experiment of your own related to plants, plant growth, and CO_2. Remember, changing one thing in the experiment changes the experiment and makes it your own, if that experiment has not been done by someone else. Example: change the plant from corn to soybeans or change from CO_2 exposure to CO exposure.

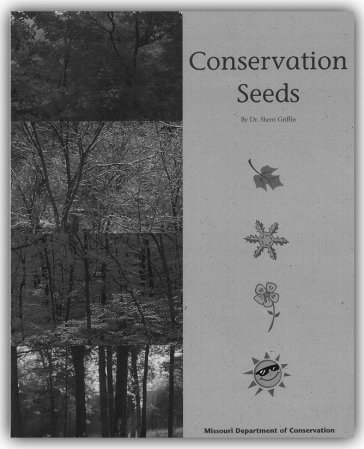
   Use the four questions below to explore various ideas for your experimental question.
   o What materials do I have available for conducting experiments on plant growth and gas levels?
   o How do plants and CO_2 (or other gases) act in relation to one another?
   o What one change can I make in the set of materials to do a different experiment than the one that was done here?
   o How will I measure the response to this change and what format will I use to record my data?
5. Now write an experimental procedure that you could use to gather data to answer the research question you developed in step number 4. This experimental procedure should include:
   o A hypothesis that describes how the change in the independent variable you chose will affect the dependent variable. Remember to use only one independent variable.
   o The independent and dependent variables and control (if there is one).
   o The things that will be held constant.
   o A list of materials needed to perform the experiment.
   o A step-wise procedure that anyone could read and follow, getting the same results as you or proving you false.
6. Answer the following questions about your experiment:
   a. What measurements would you record from your experiment? Develop a table that you could use to record the information you will gather during the experiment.
   b. What units would be most appropriate to use for these measurements?
   c. What kind of graph would you use later to represent the data you will gather?
7. With the permission of your teacher conduct the experiment that you have designed. Gather data and write a concluding report that includes whether your data supports your hypothesis. Have fun doing science.
8. Now back to the original question, "Gardens and green tracts – What do they have to do with CO_2?" Propose an answer to this question and discuss it with your classmates.

Teacher resources

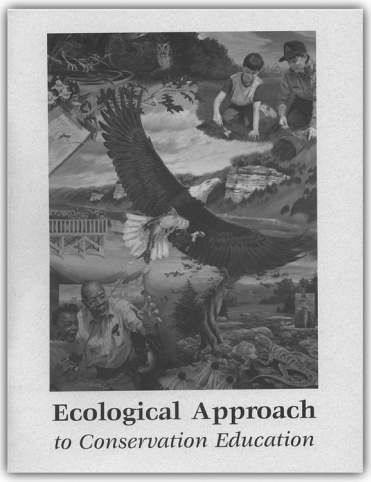
Conservation Seeds

The recently revised Department of Conservation early childhood curriculum offers the following lessons on this issue's topic of agriculture.

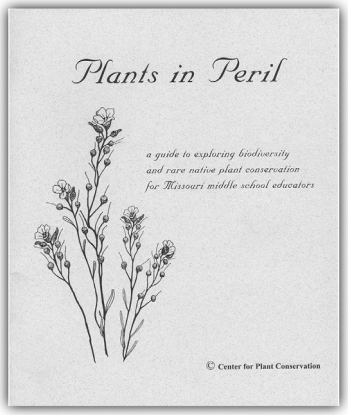
***FALL Section* - The Harvest - Lesson 15, Page 30.**
***FALL Section* - Animal Harvest - Lesson 21, Page 42.**
SPRING Section - How Does Your Garden Grow? - Lesson 23, Page 190.
SPRING Section - Seeds, Roots, Plants - Lesson 26, Page 196.
***SUMMER Section* - Harvest Time - Lesson 30, Page 286.**



Ecological Approach to Conservation Education



This instructor reference manual is designed to help teachers integrate conservation education into their curriculum. The manual provides background information and suggestions for teaching about conservation. In addition, it presents basic ecological understandings on which conservation practices should be based. The activities are designed for use with junior and senior high school students; however, elements of the narrative and activities may be adapted to all grade levels.



Plants in Peril

This guide to exploring biodiversity and rare native plant conservation is prepared for Missouri middle school educators. It explains biodiversity, reviews rare native plants and the challenges of saving them, offers four classroom activities and provides numerous educator resources.

media loan list

Creating an Urban Oasis

Junior High-Adult/ 20 min./ All formats available
Trees can make a big difference in city life. Keeping them thriving in an urban environment, though, can be a real challenge. Learn from a variety of Missourians what you can do to enhance trees in your town or city.

How Plants Get Food

Kindergarten-3/ 17 min/ VHS video
Carbon dioxide...oxygen...chlorophyll...photosynthesis. These are complex words explained in a bright, entertaining way as students learn the basics of how plants make their own food.

The Living Landscape

Upper elementary/adult 28 min/ all formats. This story portrays the American farm as a living landscape, where many life forms coexist with modern agriculture. The film shows how farming can function in harmony with the soil, plants and animals.

The books or videos listed above may be obtained by contacting Media Librarian/Distribution Center, Missouri Department of Conservation, PO Box 180, Jefferson City, MO 65102-0180 or call 573-751-4115 ext 3837 or fax 573-522-2020 or <Wolfec@mail.conservation.state.mo.us>